CLAIMS

1. Purified or isolated nucleic acid of the SPG4 gene, characterized in that it comprises a sequence chosen from the group comprising:

a) the sequence SEQ ID No. 1, the sequence SEQ ID No. 2, the sequence SEQ ID No. 72, the sequence SEQ ID No. 106 or the sequence of at least 15 consecutive nucleotides of one of these sequences;

b) the nucleic acid sequences which are homologs or variants of the sequences SEQ ID No. 1, SEQ ID No. 2, SEQ ID No. 72 or SEQ ID No. 106; and

c) the complementary sequence or the RNA sequence corresponding to the sequences as defined in a) and b).

2. Purified or isolated nucleic acid according to claim 1, with the exception of the nucleic acid identified in the GenBank databank under the accession number AB029006.

3. Purified or isolated nucleic acid according to claim 1 or 2, characterized in that it comprises at least one sequence of at least 15 consecutive nucleotides of the nt 714-809, ends inclusive, fragment of the sequence SEQ ID No. 2, of the sequence complementary thereto or of the sequence of the corresponding RNA thereof.

4. Purified or isolated nucleic acid according to one of claims 1 to 3, characterized in that it comprises a mutation corresponding to a natural polymorphism in humans.

5. Probe or primer, characterized in that it comprises a sequence of a nucleic acid according to one of claims 1 to 4.

6. Probe or primer according to claim 5, characterized in that its sequence is chosen from the sequencs SEQ ID No. 4 to SEQ ID No. 71.

7. Splice acceptor or donor site, characterized in that it comprises a sequence of a nucleic acid according to claim 1 chosen from the sequences SEQ ID No. 74 to SEQ ID No. 105.

8. Method for screening cDNA or genomic DNA libraries, or for cloning isolated genomic or cDNA encoding spastin, characterized in that it uses a nucleic acid sequence according to one of claims 1 to 7.

9. Method according to claim 8, for identifying the genomic or cDNA sequence of the SPG4 gene of mammals, in particular of mice.

10. Method for identifying a mutation carried by the human SPG4 gene, characterized in that it uses a nucleic acid sequence according to one of claims 1 to 7.

11. Method according to claim 10, for identifying a mutation responsible for autosomal dominant hereditary spastic paraplegia.

12. Method for identifying the nucleic acid sequences which promote and/or regulate the expression of the SPG4 gene, characterized in that it uses a nucleic acid sequence according to one of claims 1 to 7.

13. Nucleic acid identified using a method according to one of claims 9 to 12.

14. Polypeptide encoded by a nucleic acid according to one of claims 1 to 4 and 13.

15. Polypeptide according to claim 14, preferably with the exception of the 584 amino acid peptide, the sequence of which is identified in the GenBank databank under the accession number AB029006.

16. Polypeptide according to claim 14 or 15, characterized in that it comprises an amino acid sequence chosen from the group comprising:

a) the sequence SEQ ID No. 3, the sequence SEQ ID No. 73, the sequence SEQ ID No. 107 or the sequence of at least 10 consecutive amino acids of one of these sequences; and

b) the sequences which are homologs or variants of the sequences SEQ ID No. 3, SEQ ID No. 73 or SEQ ID No. 107.

17. Polypeptide according to claim 14 or 15, characterized in that it comprises the sequence of at least 8 consecutive amino acids of the sequence of the aa 197-228, ends inclusive, fragment of the sequence SEQ ID No. 3.

18. Polypeptide according to claim 14 or 15, characterized in that it comprises an amino acid sequence chosen from the group comprising the sequence SEQ ID No. 3, the sequence SEQ ID No. 73, the sequence SEQ ID No. 107, which sequences carrying at least one of the mutations corresponding to a natural polymorphism in humans, and the sequences of the fragments thereof of at least 10 consecutive amino acids.

19. Cloning and/or expression vector containing a nucleic acid sequence according to one of claims 1 to 4, and 13.

20. Vector according to claim 19, characterized in that it includes the elements required for its expression in a host cell.

21. Host cell transformed with a vector according to claim 19 or 20.

22. Mammal, except a human, characterized in that it comprises a cell according to claim 21.

23. Mammal, except a human, according to claim 22, comprising a transformed cell, characterized in that the sequence of at least one of the two alleles of the SPG4 gene

contains at least one of the mutations corresponding to a natural polymorphism in humans or identified using a method according to claim 10 or 11.

24. Use of a nucleic acid sequence according to one of claims 5, 6 and 13, as a probe or primer, for detecting and/or amplifying nucleic acid sequences.

25. Use of a nucleic acid sequence according to one of claims 1 to 7, and 13, for screening a genomic or cDNA library.

26. Use of a nucleic acid sequence according to one of claims 1 to 4 and 13, for producing a recombinant or synthetic polypeptide.

27. Method for producing a recombinant polypeptide, characterized in that a transformed cell according to claim 21 is cultured under conditions which allow the expression of said recombinant polypeptide, and in that said recombinant polypeptide is recovered.

28. Polypeptide, characterized in that it is obtained using a method according to claim 27.

29. Mono- or polyclonal antibodies or their fragments, chimeric antibodies or immunoconjugates, characterized in that they are capable of specifically recognizing a polypeptide according to one of claims 14 to 18, and 28.

30. Method for detecting and/or purifying a polypeptide according to one of claims 14 to 18, and 28, characterized in that it uses an antibody according to claim 29.

31. Method for genotypic diagnosis of AD-HSP associated with the SPG4 gene, characterized in that a nucleic acid sequence according to one of claims 1 to 7 and 13 is used.

32. Method for genotypic diagnosis of AD-HSP associated with the presence of at least one mutation on a sequence of the SPG4 gene, using a biological sample from a patient, characterized in that it includes the following steps:

a) where appropriate, isolation of the genomic DNA from the biological sample to be analyzed, or production of cDNA from the RNA of the biological sample;

b) specific amplification of said DNA sequence of the SPG4 gene likely to contain a mutation, using primers according to either of claims 5 and 6 or a nucleic acid according to claim 13;

c) analysis of the amplification products obtained and comparison of their sequence with the corresponding normal sequence of the SPG4 gene.

33. Method for diagnosing AD-HSP associated with abnormal expression of a polypeptide encoded by the SPG4 gene, characterized in that one or more antibodies according to claim 29 is (are) brought into contact with the biological material to be tested,

under conditions which allow the possible formation of specific immunological complexes between said polypeptide and said antibody or antibodies, and in that the immunological complexes possibly formed are detected and/or quantified.

34. Method for selecting a chemical or biochemical compound which is capable of interacting directly or indirectly with a polypeptide according to one of claims 14 to 18, and 28, or with a nucleic acid according to one of claims 1 to 7, and 13, and/or which makes it possible to modulate the expression or the activity of these polypeptides, characterized in that it comprises bringing a nucleic acid sequence according to one of claims 1 to 7, and 13, a polypeptide according to one of claims 14 to 18, and 28, a vector according to either of claims 19 and 20, a cell according to claim 21, a mammal according to either of claims 22 and 23 or an antibody according to claim 29 into contact with a candidate compound, and detecting a modification of the activity of said polypeptide.

35. Use of a nucleic acid sequence according to one of claims 1 to 7, and 13, of a polypeptide according to one of claims 14 to 18, and 28, of a vector according to either of claims 19 and 20, of a cell according to claim 21, of a mammal according to either of claims 22 and 23 or of an antibody according to claim 29, for studying the expression or the activity of the SPG4 gene.

36. Kit or pack for diagnosis, characterized in that it comprises at least one compound chosen from the following group of compounds:

a) a nucleic acid according to either of claims 5 and 6; and

b) an antibody according to claim 29.